

# Gonococcal infection of the penis

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The occurrence of skin lesions in gonococcal bacteraemia is well recognized and well documented (Keil, 1938; Abu-Nassar, Hill, Fred, and Yow, 1963; Kvorning, 1963; O'Sullivan, 1964; Ackerman, Miller, and Shapiro, 1965; Fred, Eiband, Martincheck, and Yow, 1965; Björnberg and Gisslén, 1966). Less well documented is the occurrence of lesions due to direct implantation of gonococci on the skin, either by accidental inoculation (Sears, 1947) or by sexual intercourse. The latter has been known to cause primary gonococcal skin lesions both extragenitally, for example on the sternum or in the axilla (Pugh, 1930), and genitally. Here, we are concerned with primary gonococcal skin lesions of the male genitalia and we restrict ourselves to those involving the penis. Such lesions are infrequently reported and are undoubtedly rare. It is possible that the gonococcus is not always looked for in such lesions because it is not expected; and this is perhaps because stratified squamous epithelium has for long enjoyed a formidable reputation as a most inhospitable host to this organism.

Hunter's ill-fated and misleading self-inoculations of 1767 notwithstanding (Hunter, 1786), early unsuccessful experiments between 1789 and 1880 in inoculating the glans, prepuce, or shaft of the penis, listed by Hill (1943) in her comprehensive review, created the impression that primary gonococcal infection of the skin was extremely improbable if not impossible. This belief was epitomized by Bumm in what Belgodère (1930) described as the *loi de Bumm*, which *contestait dogmatiquement au gonocoque tout pouvoir agressif vis-à-vis des épithéliums pavimentaux*. Belgodère quoted this argument in 1930 in order skilfully to demolish it. But 15 years later Harkness declared 'I do not consider it to be possible for the gonococcus to penetrate a healthy epidermis, and in my opinion it is always necessary for the superficial layers to be destroyed before the organisms are able

to gain a footing. . . . Persistent gonococcal discharges in the region of abrasions are, in my opinion, always present before infection of the epidermis can occur' (Harkness, 1945). Do the published cases support this hypothesis?

We have traced twelve reports, published in English between 1924 and 1971, concerning gonococcal lesions of the penis (Mills, 1924; Lowry and Franks, 1943; Kroll and Cohart, 1944; Harkness, 1945; Mee, 1949; Scott and Thomsen, 1950; Marmell, 1952; Byers and Bradley, 1953; Bernfeld, 1961; Landergren, 1961; Haim and Merzbach, 1970; Burgess, 1971); they comprise nineteen cases and involve twenty separate lesions or groups of lesions. The presenting appearances include pimples, blebs, masses, erosions, ulcers, and draining sinuses.

We propose to divide these nineteen cases into two groups (Table):

GROUP A. Those cases which are infections *not* primarily of the epidermis but rather of ducts or sinuses therein.

GROUP B. Those cases which are infections of the penile epidermis itself.

The raphe on the ventral surface of the shaft and prepuce, often called the median raphe and formed from the junction of the folded edges of the urethral groove (Arey, 1940), is well known to be the site of congenital anomalies and defects, wherein, it has long been thought, gonococci embed more easily. Kroll and Cohart (1944) cited Jesionek as having advanced this view as long ago as 1903. Evidence of sinuses, ducts, or tracts, located in the raphe and infected with gonococci, is mentioned by Harkness (1945), Mee (1949), and Bernfeld (1961). In all, eight cases involving the median raphe and one case involving Tyson's duct are placed in Group A because they are regarded as infections of sinuses, ducts, or the like. A gonococcal discharge was present in four of those nine cases. It is proposed to exclude Group A from further consideration.

We are left, therefore, with ten cases of infection of the skin of the penis (Group B) and in none of these was there a gonococcal urethral discharge. (Actually, one patient, Scott and Thomsen's Case 2,

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noticed a transient urethral discharge on one occasion only, 12 days before he attended, but "a urethral discharge was not present at the time of admission, nor was any noted during the period of hospitalization".)

Among the references given, we have read of only one case of primary cutaneous infection of the penis with a history of trauma. Two days after intercourse, Haim and Merzbach's patient developed an ulcer on the prepuce 'at a place which had been scratched by the nails of his sexual partner'. The incubation period was much shorter than in any of the other cases and one is led to conclude that the implantation of the gonococcus was facilitated by the trauma. Compare Sear's case, in which a laboratory worker, after accidentally cutting his hand with a broken vial containing *N. gonorrhoeae*, developed a gonococcal skin lesion between 43 and 65 hrs later.

On the published evidence we have considered, we feel justified in concluding that neither exposure to prolonged urethral discharge nor trauma are *necessary* aetiological factors in primary gonococcal skin infection. Urethral discharge seems to be a factor only in certain median raphe cases (4 out of 8 cited) and trauma appears to be a great rarity.

### Case reports

**Case 1, an insurance broker aged 47**, who was separated from his wife, admitted an exposure 10 days previously. He complained of a sore on the penis, which had appeared the day before. He denied any previous venereal disease.

#### Examination

There was a pustule 4 mm. in diameter below and separate from the urethral meatus. There was no urethral discharge, no other skin lesion, and no lymphadenopathy. The urine was clear in both glasses. The pustule was carefully pricked, the pus was cleared from the lesion with a sterile swab, and the lesion itself was squeezed. Material scraped from its surface with a platinum loop was smeared on a slide and streaked on a chocolate agar plate and incubated. Although there was neither complaint nor visible evidence of urethral discharge, a scraping was made from the urethra for smear and culture. The lesion was then photographed. Fig. 1, an enlargement of a detail from the original amateur photograph, indicates the appearance and situation of the lesion.

#### Smears and cultures

Both smears showed a large number of Gram-negative diplococci, morphologically resembling gonococci, and no other organisms. Many pus cells were present. *N. gonorrhoeae* were isolated in both cultures; they were sensitive to 0.06 unit penicillin per ml. and moderately resistant to tetracycline.



FIG. 1 Lesion below meatus in Case 1

#### Treatment

Penicillin (1.2 m.u. procaine penicillin intramuscularly and 1 g. ampicillin orally), given at the patient's first attendance, proved effective, and the lesion had completely healed by the time of his last attendance 2 weeks later. A urethral smear and a culture, taken on the day after treatment, revealed no diplococci. Serological tests for syphilis were negative.

The consort was known but unfortunately eluded attempts to secure her attendance.

**Case 2, an unmarried electrician aged 20**, gave a history of exposure with the same consort regularly during the preceding 3 weeks until 3 days before attendance. He denied any previous venereal disease. He complained of a urethral discharge present for the preceding 2 days and of a pimple on the penis, present for 1 week, which had burst the previous day.

#### Examination

There was a profuse purulent urethral discharge and a boil on the penile shaft, situated half way up on the right side. There was no other genital lesion and there were no signs of mucocutaneous syphilis. The urine was hazy in the first and faintly hazy in the second glass. The urethral meatus and the penile lesion were cleaned with separate sterile swabs and material from each was obtained for culture plates and slides as in the first case. On this occasion, no camera was available, but we were fortunate in having the services of an artist, Mr. C. J. Earley, who, after

the pus had been evacuated and the specimens taken, produced the picture which is shown in Fig. 2. The lesion, which was more than 1 cm. in diameter, was rounded and had reddened raised edges. It was not tender.

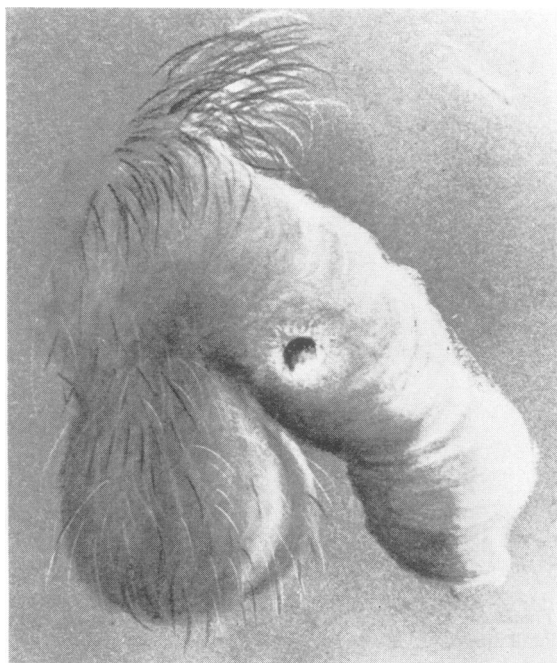


FIG. 2 Drawing of lesion on side of shaft in Case 2

#### Smears and cultures

The material on both slides had the same microscopic characteristics: numerous Gram-negative diplococci morphologically resembling gonococci, numerous pus cells, some epithelial cells, and no other organisms.

Gonococci were isolated on culture of the material from both the pustule and the urethra; they were sensitive to penicillin (MIC=0.015 u./ml.) and to tetracycline.

#### Treatment

Penicillin (1.2 m.u. procaine penicillin intramuscularly and 1 g. ampicillin orally), given at the first attendance, was promptly effective. After 2 days there was no urethral discharge and no discharge from the penile ulcer, over which a scab was forming. On this occasion, the urine had fine threads in the first glass and was clear in the second. The smear of a thread taken from the shaft showed no Gram-negative diplococci but contained other organisms as well as pus cells and epithelial cells. No gonococci were this time isolated on culture. One week after treatment, the lesion on the shaft was completely healed. As there was still debris in the urine, revealing on Gram-staining organisms other than diplococci and, on culture, no gonococci, a course of tetracycline 250 mg. four times a day for 7 days was prescribed.

1 week later, the urine was clear and the patient asymptomatic. Serological tests for syphilis were negative on the first attendance and at the final attendance nearly 11 weeks later.

The consort's urethral and cervical cultures were positive for gonococci with the same sensitivity pattern as that of the male patient.

#### Discussion

Both our cases fall into Group B, which for some as yet undetermined reason has hitherto appeared to be characterized by absence of urethritis. Harkness's insistence on the presence of gonococcal discharge is understandable when it is realized that his penile cases were median raphe cases (Group A) associated with a profuse gonococcal urethritis. Our two cases are unusual in that they both fall into Group B, yet both had evidence of urethritis, the first being latent and the second frank. In our Case 1, as in Marmell's case, the lesion was close to the urethral meatus but there was no urethral discharge. Here, however, *the urethral infection was unmasked by testing urethral scrapings*. Looking through the reports of all the previous cases in Group B that we have cited in the Table, we find no reference to smears or cultures from the urethral mucosa except in Landergren's case, in which 'culture of specimens from the urethra' was specifically stated to be 'negative for gonococci'. In two cases, endoscopy was performed and in two others it was stated there was 'no evidence' of infection. In Scott and Thomsen's Case 2, in which the patient had noticed a transient urethral discharge on one occasion only 5 days after exposure

TABLE Reports of cases of gonococcal infection of the penis published in English, 1924-1971

Group	Case	Site	Urethral discharge
A	Lowry and Franks's case	Raphe	No
	Krok and Cohart's 3rd case	Raphe of prepuce	Yes
	Harkness's 1st (penile) case	Raphe of prepuce	Yes
	Harkness's 2nd (penile) case	Raphe	Yes
	Mee's 1st (penile) case	Raphe	No
	Mee's 2nd (penile) case	Raphe	No
	Mee's 3rd (penile) case	Raphe	No
	Bernfeld's case	Raphe	Yes
	Burgess's case	Tyson's duct	No
B	Mills's case	Prepuce	No
	Kroll and Cohart's 1st case	Dorsum of shaft (2 sites)	No
	Kroll and Cohart's 2nd case	Frenulum	No
	Scott and Thomsen's 1st case	Dorsum of shaft	No
	Scott and Thomsen's 2nd case	Dorsum of shaft	No <sup>a</sup>
	Scott and Thomsen's 3rd case	Dorsum of shaft	No
	Marmell's case	Distal end of penis, ventral to meatus	No
	Byers and Bradleys case	Frenulum	No
	Landergren's case	Dorsum of shaft	No
	Haim and Merzbach's case	Prepuce	No

<sup>a</sup>suggestive history

and 12 days before attendance, 'a urine culture was negative for *Neisseria gonorrhoeae*'.

Why is the urethra considered to escape infection so frequently in these cases? Marmell (1952) suggested an alteration in the host-parasite relationship which altered the predilection of the organism for the urethral mucosa, spared this normal portal of entry, and attacked the usually resistant skin. Of this, there is no proof. Burgess (1971) thought that urethritis was sometimes averted, as in the case he described, by post-coital micturition. We suggest that the urethra may not have escaped infection as often as was supposed. The absence of a visible urethral discharge may not always have denoted the absence of a urethral infection.

Is site of significance? Of ten Group B cases in the literature, presenting with eleven separate lesions (or groups of lesions), there were six dorsal lesions and five lesions at the distal end of the penis (including two on the prepuce). The distal end might be thought to be more vulnerable because of proximity. Is the incidence on the dorsum related to the fact that the lymphatics draining the penis run along its dorsal surface? Harkness (1945) cited Scholtz's report of 1899 of a "subcutaneous abscess along the dorsum of the penis, which developed in a nodular swelling on the course of an acute lymphangitis". But of gonococcal ulcers at the side of the penile shaft, we have found no previous mention: in this respect also, our Case 2 appears to be unique. There was no evidence of trauma, nor was there any suggestion of a gonococcal infection developing at the site of a luetic, scabetic, or other lesion.

## Summary

Consideration is given to the literature of primary gonococcal infection of the penis; and a clear distinction is drawn between primary infection of ducts and sinuses opening on to the skin and primary infection of the epidermis itself. The absence of urethral discharge in previous reports of cases in the second group is noted.

The significance of preceding urethral discharge, trauma, and site of infection is considered.

Two cases of primary infection of the skin of the penis are described. Both were characterized by urethral infection, in apparent contrast to the other cases of this type noted in the literature. In one of the cases there was no apparent discharge and the infection was detected only by testing urethral scrapings. It is suggested that the absence of a visible discharge noted in previous case reports may not always have denoted the absence of urethral infection.

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## Infection gonococcique de la verge

### SOMMAIRE

On passe en revue la littérature concernant l'infection gonococcique primaire de la verge et on distingue nettement l'infection des conduits divers s'ouvrant sur la peau de l'infection primaire de l'épiderme lui-même. On note, dans les cas rapportés antérieurement, l'absence d'écoulement urétral pour le deuxième groupe.

On considère la signification d'un écoulement urétral précédent, du traumatisme et du siège de l'infection.

Deux cas d'infection primitive de la peau de la verge sont décrits. Contrairement aux autres cas de ce type mentionnés dans la littérature, tous les deux furent caractérisés par une infection urétrale; dans un de ces cas, il n'y eut pas de suppuration apparente et l'infection fut seulement découverte par les prélèvements urétraux. On pense que l'absence de suppuration visible signalée dans les observations antérieures ne peuvent pas toujours signifier l'absence d'infection urétrale.